SAE Aerospace
An SAE International Group

AEROSPACE RECOMMENDED PRACTICE

SAE ARP1313 | REV. C

Issued 1975-06
Reaffirmed 2000-10
Revised 2009-07

Superseding ARP1313B

(R) Determination of Trace Elements in High Temperature Alloys

RATIONALE

ARP1313C is a complete revision of this recommended practice to incorporate current analytical procedures.

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) describes procedures for the determination of trace elements listed in AMS2280 for Nickel, Cobalt, and Iron-based high temperature alloys.

1.1 Safety-Hazardous Materials

While the materials, methods, applications and processes described or referenced in this procedure may involve the use of hazardous materials, this document does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2280 Trace Element Control, Nickel Alloy Castings

2.2 The following literature is cited as background on the development of the analytical procedures described herein:

2.2.1 Background Correction Techniques

Slavin, W., Carnick, G. R., “CRC Critical Rev. Anal. Chem.” 19 (1988) 95-134

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
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2.2.2 Solution GFAAS Method

Welcher, G. G., Kriege, O. H., Marks, J. Y., “Anal. Chem.” 46 (1974) 1227-1231

Sotera, J. J., Cristiano, L. C., Conley, M. K., Kahn, H. L., “Anal. Chem.” 55 (1983) 204-208

2.2.3 Solid GFAAS Method

Marks, J. Y., Welcher, G. G., Spellman, R. J., “Applied Spectroscopy” 31 (1977) 9-11

Irwin, R., Mikkelson, A., Michel, R. G., Dougherty, J. P., Preli, F. R., “Spectrochim Acta, Part B” 45B (1990) 903-915

2.2.4 Relevant ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E50 Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals

ASTM E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

ASTM E353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

ASTM E354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

ASTM E1184 Electrothermal (Graphite Furnace) Atomic Absorption Analysis

ASTM E1361 Correction of Interelement Effects in X-Ray Spectrometric Analysis

ASTM E1473 Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys

ASTM E1621 X-Ray Emission Spectrometric Analysis

ASTM E1770 Practice for Optimization of Electrothermal Atomic Absorption Spectrometric Equipment

ASTM E1834 Determination of Lead in Nickel Alloys by Electrothermal Atomic Absorption Spectrometric Method

ASTM E1835 Analysis of Nickel Alloys by Flame Atomic Absorption Spectrometry

3. INSTRUMENT AND TEST METHOD REQUIREMENTS

3.1 Known methods of measuring the elements listed in AMS2280, at trace levels, are listed below. Other analytical methods acceptable to purchaser may be used.

3.1.1 Atomic Absorption (Graphite Furnace and Flame)

3.1.2 Inductively Coupled Plasma Optical Emission Spectrometry

3.1.3 Inductively Coupled Plasma Mass Spectrometry

3.1.4 Glow Discharge Mass Spectrometry

3.1.5 Glow Discharge Optical Emission Spectrometry

3.1.6 Hollow Cathode Optical Emission Spectrometry